Serious Games between simulation and game. A proposal of taxonomy

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Abstract

The concept of Simulation refers to different spheres and has different aims. According to the area it may concern, it relates to several concepts and definitions. Our research helped us to single out some distinctive characteristics of simulation, of games (as a key subject) and of their connections. Elaborating the subject was useful to indicate a set of typologies with specific objects and applications. We hope the taxonomy we presented will contribute to a shared vision of the topic, being the first step towards a more systematic schematization than the ones studied and developed so far.

1 Introduction

The use of simulations for educational purposes has been studied for several years, however this is still an experimental field.

The concept of simulation has different spheres in which it is used for different aims (from laboratory tests to market estimations, from crime simulations for juridical purposes to education), and in accordance with the disciplinary area it belongs to, it is connected to many other concepts: we can say that it does not answer back to a one and only definition.

Before facing the problems and the opportunities of simulations, it is necessary to discuss the general concept, analyzing its characteristics to have a broader vision of the topic.

This article wants to explain our proposal of interpretation of the concept of simulation and the ways it could be included in the educational sphere; a proposal of taxonomy could be useful to generate a debate, could contribute to new reflections on the topic and could create a shared vision.

2 Game or Simulation?

When trying to define the use of simulations for learning purposes, the concept of game is very recurrent: often, the terms «Serious Game» or «Business Game» are ordinarily joined to simulations: it is obvious that game and simulation have a connection.

But what is it that joins one concept to the other?

Not all simulations have the typical features of games, but surely a great number of them use certain features of games to reach their aims.

To better understand and categorize all the examples of simulation we have considered that the concept of Game could be a basilar element of definition to give a systematic order to the numerous typologies of simulation (even the ones not directed to learning).

This proposal of taxonomy will not answer in an exhaustive way to the discussion we faced, but its aim is to contribute to the researches on possible uses of simulations in the learning area.

First thing to do is to provide an all-embracing definition of the meaning the term «simulation» could have in the Italian language nowadays.

3 Simulation

Simulation is often seen negatively: for instance when its aim is to pretend a deceit, «showing feelings, qualities, fake inclinations that are in contrast with the reality, to provoke false opinions, to promote wrong conditions» (as when we think about the juridical world and the making of false accusations).

But sometimes simulation has positive uses, in literature for instance. In this case, we can define simulation as the capability to represent events, situations and feelings.

With the term simulation we can also mean a «model of reality, allowing people to valuate and preview the dynamic development of a set of events, due to the imposition of certain conditions by the analyst or the user», a sort of transposition in logical-mathematic-procedural terms of a 'conceptual model' of reality, defined as the whole of processes happened in the valuated system and that help people to understand the system itself.

4 LabSim

The main feature of a simulation is, in any case, the fact that it is used to reproduce reality in a simplified way, so that we can better understand why things happen and how.

According to this, a simulation is something like an experimental laboratory, in which we can observe and, at the same time, personally experience the simulated reality.

This type of simulation, that we will call LabSim, is managed by a device that is predisposed with rules made to be followed by the model. These can be modified by the user through Ronsivalle «abstract manipulation» (Ronsivalle, 2009)[1].

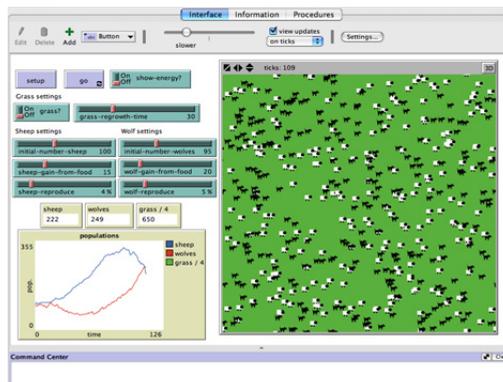This is a screen of one of Netlogo library's simulations[2].

Fig. 1.Netlogo. Simulation of sheep plundering (screenshot made by the authors of the program Netlogo).

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[1] According to the author, it is the result of the conscious action of the user through the theoretical mathematical structure governing the model.

[2] Netlogo is a " programmable model" in which social and natural processes are simulated. It could be downloaded here: http://ccl.northwestern.edu/netlogo/.

Once the simulation has started, the user can modify some of the parameters through the control panel on the left (as the initial number, wolves and sheep speed of reproduction, grass growth's speed).

The effects due to these modifications are shown both on the right, in the animation, and down on the left, through the chart and the concerning values.

5 TaleSim

There are many types of simulation counting on an interaction between the user and the system.

Differently from a LabSim, TaleSim provides a «direct manipulation» (Ronsivalle, 2009)[3], in which the user is able to live inside the story.

Starting from an initial situation, the user is called to make some choices to reach the final goal; anyway this goal is not the real aim of the TaleSim.

The thing that is important is the whole path the user has travelled.

In this sense, the interface has the task to represent the described situations, allowing the user to have a personal involvement too.

These tools are useful to study all those phenomena and epiphenomena that, as Antinucci asserts, are too far away, in time and space, too dangerous, too big or too small, too long or too fast, abstract or not perceptible with senses.

To better understand this involvement, it is necessary for us to introduce the concept of Game.

6 Game

Johan Huizinga in his famous "Homo Ludens" of 1938, was the first to treat the concept of game in a systematic way, showing its importance in the development of society.

In his opinion, every game is an action full of signification; it means something and its applications could answer to a lot of necessities (as the taste for imitation, or an introductory exercise to some activity), most of all, games are often used to learn an action having a biological utility (as prehistoric kids playing hunting to learn the necessary skills to hunt once adults).

«Nature could give to her offspring all those functions useful to let energy off, to relax, to learn, and compensate, even through exercises and mechanical reactions. Whereas She did not. She gave us Play, with its tension, joy and "joke"» (Hiuzinga, 1973, p.13)[4].

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[3] The interaction consists in turning virtual things into a direct connection with robot and peripheral devices.

[4] "Once played, the memory of it remains in our mind as a creation or a treasure of the spirit, it is handed down and could be repeated at whatever time, that is immediately (…) or even after a long time..".

To have an exhaustive definition of game we must talk about Roger Caillois and his "Les Jeux et les hommes: le masque et le vertice (Games and men)" written in 1958. He defined a game as an activity that must have the following six characteristics: fun, the activity is chosen for its light-hearted character; separate, it is circumscribed in time and place; uncertain, the outcome of the activity is unforeseeable; non-productive, participation is not productive; governed by rules, the activity has rules that are different from everyday life; fictitious, it is accompanied by the awareness of a different reality.

Moreover, he argues that there are four basic types of play: Agon, a game with rules or competition (chess is an almost purely agon game); Alea, or chance (playing a slot machine is an almost purely alea game); Mimicry, or role playing (like theatre or war play); Ilinx (Greek for "whirlpool"), or vertigo, in the sense of altering perception (riding roller coasters in fun fairs).

7 Game and Simulation

Two of the basic types of play studied by Caillois have the same features as simulation: they are Agon and Mimicry.

The intersection between these two sets (image 2) provides three areas: the first one contains games with rules (card games), the second contains imitation games (playing with dolls), and the third area contains, because of the intersection, all those games having both characteristics (role playing games).
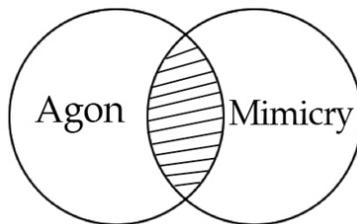

Fig. 2. Intersection between Agon and Mimicry.
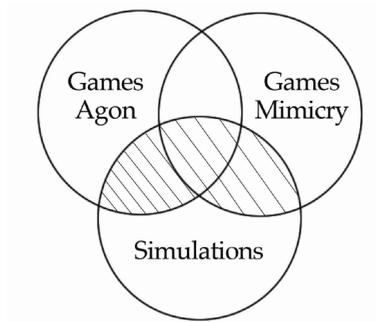
Joining another set to these two (image 3).

Fig. 3. Intersection of Agon, Mimicry and Simulation.

Here is the area created by Simulation and game. LabSims are not included, since they do not have the same characteristics of games; TaleSims instead, are part of this interaction because they show both simulation and game features.

So we can assert that the latter are the most involved simulations when talking about Serious Games.

What is a Serious Game?

8 Serious Game

A Serious Game is an interactive experience with the same characteristics of a game. It could have different aims, like business training, educational or social campaigns, and promotional activities. Moreover, it reproduces real situations in which using knowledge and acting with strategy it could help to reach a final goal.

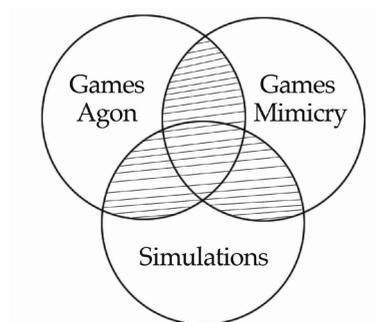You can find Serious Games in the highlighted zone

Fig. 4. Serious Game area.

This way, the Serious Game area includes both TaleSim and the intersection between Agon and Mimicry, in which we can find all those Serious games having only a recreational aim, like role-playing games.

9 Map and Territory

The definition of Simulation concerning the meaning of "pretending" (a football player simulating a foul) could have a connection with the concept of Mimicry: in fact, they both have this characteristic.

Therefore, it is necessary to better explain the two concepts.

Why - and when - can we talk about Simulation and not Mimicry (or vice-versa)?

In Mimicry we can see that pretending refers to the fact that we think "the map is the territory": the object or the situation we see is the only conceivable reality.

When this game begins, we find ourselves completely dipped into a "magic circle" having narrowed time and space and presenting a "suspension of disbelief" which helps us to live in a fantasy world.

In Simulation we know that "the map is not the territory", it is just a map: a symbolic representation of reality.

The relation between Simulation and Game is very similar to the one existing between simile and metaphor in rhetoric.

A simile is introduced by the words "like" or "as", and when we are in a simulation we act by pretending, all the time the simulation lasts. What we see is not the true reality, but just a representation of it.

During Mimicry, "pretending to do something" helps the user to enter a fantasy world, created in the circle of simulation. And it is considered completely real; we can say it is a metaphor of the world.

10 A proposal of Taxonomy

For a better understanding, we now analyze each area generated from the intersection of the Agon, Mimicry and Simulation sets.
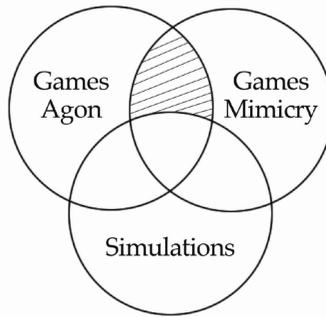
Fig. 5. Intersection between Agon and Mimicry (Role Playing Game).

(Agon∩Mimicry)-Simulations: Serious games in which Agon rules join Mimicry fiction without obligatory simulating situations borrowed from reality, like role playing games. In these games, a fantasy world is completely ruled, and every player could pretend to be a certain character with particular abilities and goals to reach. The fiction we are referring to is the one of the Mimicry (in fact, "the map is the territory"), and there is no typical aspect of simulations.
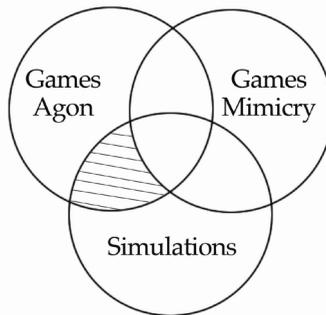

Fig. 6. Intersection between Agon and Simulations (Business Game).

(Agon∩Simulations)-Mimicry: Serious games having a strong normative aspect, without any characteristic of Mimicry. Here they are Business games, in which the simulation is like a model of reality and it is joined to the competitive and normative aspects of the game itself.
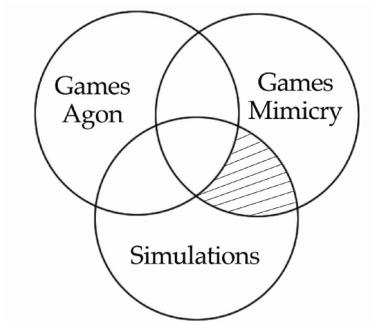
Fig. 7. Intersection between simulations and Mimicry (Serious Game to improve Soft Skills).

(Mimicry∩Simulations)-Agon: Serious games simulating reality in modality and representation. For example, serious games aiming to improve Soft Skills.

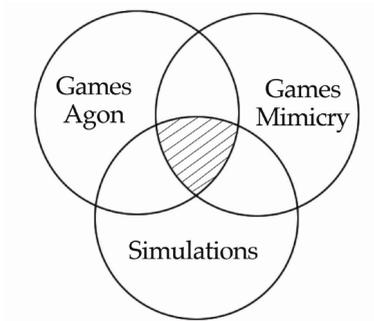Fig. 8. Intersection of Agon, Simulations and Mimicry (Serious Games as Flight Simulators).

Agon∩Simulations∩Mimicry: Serious games copying two aspects of reality: simulating modality and imitation of Mimicry. Moreover they follow Agon rules. An example of it is a flight simulator; in fact, they represent a model of reality in which the interface is the airplane.

Conclusion

When talking about Simulation it is very important to define the concept of game. Our considerations on typical aspects of the two subjects outlined some distinguishing characteristics and sets including specific kinds of applications.

After a long discussion on the difficulties in finding an exhaustive definition, we found an interpretation of different kinds of Simulation able to give an answer to the most frequent questions on the subject.

The taxonomy we presented insofar is just the first step towards a final definition aiming, if possible, to a systematic organization of the set of simulations.

Researching enters then in a new phase, in which individuating typified dimensions of simulation will conduct to a more systematic schematization than the one studied and developed so far.

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